An unceasing problem prevalence and risk factors of schistosomiasis among children in Yemen

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PSAC were determined from the WHO Child Growth Standards. Overall prevalence of *S. mansoni*, *S. haematobium* and STH was 28.2%, 31.4% and 3.9%, respectively. Of the 396 stool samples positive for *S. mansoni*, egg density was 258.9 ± 569.1; 241 (60.8%), 98 (24.8%) and 57 (14.4%) were light, moderate and heavy infections, respectively. The youngest infected child was one year of age. Stunted growth was observed in 21% of PSAC, of whom 7.4% were severely stunted. Underweight and wasting were observed in 8.8% and 3.1% of PSAC, respectively, and 22.7% of PSAC were malnourished. The prevalence of anemia, independent of infection (n = 1,165), was 30.2%; 67.1%, 29.6% and 3.4% had mild, moderate and severe anemia, respectively. Growth morbidities and anemia were not associated with *S. mansoni* infection. Our findings add to evidence that young children are at risk for *S. mansoni* infection, and that infections debut before school enrollment age in high endemic areas. With acquisition of infection early in life, children might not receive first treatment for up to 4 years after infection if present deworming policies are not revised. PSAC are a potential reservoir for transmission, emphasizing the need for their inclusion when designing control strategies.

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PUROMYCIN ACTIVITY AGAINST SCHISTOSOMA MANSONI FOR DEVELOPMENT OF AN ANTIBIOTIC SELECTION SYSTEM MEDIATED BY RETROVIRAL TRANSGENESIS

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Drug selection of transgenic schistosomes would be desirable as it would provide a means to enrich for populations of transgenic worms. We recently demonstrated that Murine Leukemia Virus (MLV) transduced schistosomes expressing neomycin phosphotransferase (NeoR) could be rescued using the aminoglycoside antibiotic, G418. In addition, after infecting snails with miracidium hatched from the snails released the presence of transgenes, demonstrating that transgenes had been transmitted through the asexual developmental cycle, and confirming germline transgenesis. Moreover, the germline-transmitted transgenes encoding NeoR rescued cultured schistosomules from toxicity of the antibiotic G418. However, the aminonucleoside antibiotic puromycin has been shown to be faster and more efficient than G418 in selecting transgenic vertebrate cells (i.e. within 48 h). Accordingly, here we tested schistosome sensitivity to puromycin for eventual use in deriving selection of transgenic schistosomes via transduction of eggs with MLV carrying the puromycin resistance marker (PuroR). Schistosomules, eggs from liver or laid in vitro by adults, and sporocysts of *Schistosoma mansoni* were cultured in increasing concentrations of puromycin. Media and antibiotic were periodically replaced, and schistosomules and sporocysts were scored as live or dead by dual-fluorescence bioassay. Viability of schistosome eggs isolated from liver was evaluated by an egg hatch assay on days 5 and 10, whereas the development of the eggs laid in vitro was monitored microscopically every day and by egg hatch assay on day 7. Although eggs were susceptible or resistant to G418, the developmental stages examined here were sensitive to puromycin. These findings will facilitate not only ‘dual selection’ of schistosomes with G418 and puromycin, but also the enrichment of MLV-transduced eggs and sporocysts that can be reintroduced in the life to cycle of the parasite augmenting the efficiency of the transgenic approach.

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AN UNCEASING PROBLEM: PREVALENCE AND RISK FACTORS OF SCHISTOSOMIASIS AMONG CHILDREN IN YEMEN

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Schistosomiasis, one of the most prevalent neglected tropical diseases, is a life-threatening public health problem worldwide. In Yemen, schistosomiasis is the second leading cause of death, after malaria, with an estimated 3 million people are infected. This study aims to determine the current prevalence and associated risk factors of schistosomiasis among children in rural Yemen. Urine and fecal samples were collected from 400 children. Urine samples were examined using filtration technique for the presence of *Schistosoma haematobium* eggs while fecal samples were examined using formalin-ether concentration and Kato Katz techniques for the presence of *S. mansoni* eggs. Demographic, socioeconomic, behavioral and environmental information were collected using a pre-tested questionnaire. Overall, 31.8% of the participants were found to be positive for schistosomiasis; 23.8% were infected with *S. haematobium* and 9.3% were infected with *S. mansoni*. The prevalence of schistosomiasis was significantly higher among children aged >10 years compared to those aged ≤10 years (P < 0.05). Multivariate analysis confirmed that presence of other infected family member, low household monthly income, using unsafe sources for drinking water, living nearby stream/spring and living nearby pool/pond were key factors significantly associated with schistosomiasis among these children. In conclusion, these findings support an urgent need to start an integrated, targeted and effective schistosomiasis control programme with a mission to move towards the elimination phase. Besides periodic drug distribution, health education and community mobilisation, provision of clean and safe drinking water, introduction of proper sanitation are imperative among these communities in order to curtail the transmission and morbidity caused by schistosomiasis.

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CLINICAL AND ULTRASONOGRAPHIC CORRELATES OF HEPATOSPLenic SCHISTOSOMIASIS AMONG CHILDREN AND ADULTS IN A SCHISTOSOMA MANSONI HYPERENDEMIC RURAL AREA OF ZAMBIA

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The aim of schistosomiasis control programs is to reduce disease morbidity. However, comprehensive evaluation of these programs using available morbidity assessment tools is limited. Here we present clinical and ultrasonography correlates of hepatosplenic schistosomiasis among children and adults in a rural area of Zambia illustrating the limitations in these tools. Seven hundred fifty-four community members (159 children and 595 adults) from four rural locations (Mwadasengo, Luampa, Namando and Mangango) of Kaoma District had clinical assessments (September-October 2012) and were tested for *Schistosoma mansoni*, other helminths, malaria, and haemoglobin status. Ultrasonography was done in 710(94%) participants to check for liver abnormalities. Of the 717 screened for parasitic infections, *Schistosoma mansoni*, hookworm, and malaria infection prevalence were 42%, 26.9%, and 6.5%, respectively. Twelve percent had hookworm-*S. mansoni* co-infection, 5.2% *S. mansoni*-malaria and 1.95% *S. mansoni-hookworm*-malaria multiple infections. On ultrasonography 72.4% had no periportal fibrosis (PPF), 14.4% had mild while 7.2% and 6% had moderate and severe PPF, respectively. On logistic regression, sex-female (odds ratio [OR] = 2.0; 95% CI= 1.26, 3.30) and *S. mansoni* infection prevalence were 42%, 26.9%, and 6.5%, respectively.